

REMARKS

Claims 1, 2, 4-18, 20-23, 25-28, 30-33, 35-38, 40-43, 46-49 and 56-63 are pending. By this Amendment, claims 1, 12, 20, 25, 30, 35, 40, 46 and 56 are amended; and claims 19, 24, 29, 34, 39, 44, 45 and 50-55 are canceled. Reconsideration based on the following remarks is respectfully requested.

Entry of the amendments is proper under 37 CFR §1.116 since the amendments: (a) place the application in condition for allowance (for the reasons discussed herein); (b) do not raise any new issue requiring further search and/or consideration (since the amendments amplify issues previously discussed throughout prosecution); (c) satisfy a requirement of form asserted in the previous Office Action; (d) do not present any additional claims without canceling a corresponding number of finally rejected claims; and (e) place the application in better form for appeal, should an appeal be necessary. The amendments are necessary and were not earlier presented because they are made in response to arguments raised in the final rejection. Entry of the amendments is thus respectfully requested.

The attached Appendix includes marked-up copies of each rewritten claim (37 C.F.R. §1.121(c)(1)(ii)).

I. ELECTION/RESTRICTION OF CLAIMS

The Office Action affirms the non-election with traverse of claims 19, 24, 29, 34, 39, 44, 45 and 50-55. The Office Action now requires cancellation of non-elected claims or other appropriate action under 37 C.F.R. §1.144. In response, these claims are canceled to obviate the requirement.

II. THE CLAIMS SATISFY THE REQUIREMENTS UNDER 35 U.S.C. §112, FIRST PARAGRAPH

The Office Action rejects claims 1, 2, 4-18, 21-23, 25-28, 30-33 and 35-38 under 35 U.S.C. §112, first paragraph, as containing subject matter not described in the specification. This rejection is respectfully traversed.

The Office Action asserts that the second step of the invention of this application is performed at atmospheric pressure or higher, that melt crystallization processing is performed under a low pressure, and that both atmospheres produce the same effect with respect to crystallization. This assertion is respectfully traversed. *where?*

The claimed invention of this application establishes an atmospheric pressure at the time of laser irradiation in order to control a dispersion distance of an object material (e.g., silicon) which is generated when the laser is irradiated. As disclosed in the specification at page 19 of the December 11, 1997 specification and at page 27 of the September 30, 1997 specification, the structure of the claimed invention of this application is to provide an effect that if the atmosphere is at atmospheric pressure or higher at the time of melt crystallization, the distance between the object material and the introduction window can be made approximately 20 mm, and as a result, the size of the supply chamber, i.e., the device itself, can be made small. *not needed in claims*

Thus, according to the structure of the claimed invention of this application, the dispersion distance of the object material is controlled to be small. *not in claims*

The reference to the partial pressure relates to the partial pressure content of the hydride or hydrogen molecules in the overall atmosphere. For example, page 12, lines 4-6 recite "the partial pressure of hydrogen or hydride in the atmosphere should be about 10 mTorr or more." This is still in the context of the second step. As recited at page 8 of the December 11, 1997 specification, "in the second step, metal crystallization proceeds in a mixed gaseous atmosphere containing hydrogen molecules (H₂) and an inert gas." Thus, the hydrogen-containing atmosphere also comprises an inert gas, the total pressure being of at least atmospheric pressure, as now recited in claims 1, 12, 20, 25, 30, 35, 40, 46 and 56. *which spec? line 33*

The Office Action further asserts that the Applicants' present recitation does not recite the two separate steps with two different pressures, but recites the implantation step with the pressure of the second step. This assertion is respectfully traversed.

As discussed above, the atmospheric pressure or higher of the hydrogen-containing atmosphere of inert gas, as recited, relates to step 2, which is the melt crystallization step, as clarified in the claim amendments.

The atmosphere under which the first step of forming a thin film is conducted under various known processes. For example, the specification, at page 29 of the December 11, 1997 specification, discloses that chemical vapor deposition process (CVD processes) such as PECVD, a APCVD or LPCVD, or a physical vapor phase deposition process (PVD process) such as sputtering or vapor deposition. Thus, the first step is possible by means of various processes, not only under an atmospheric pressure.

For at least these reasons, Applicants respectfully traverse the Office Action's assertions, and respectfully request withdrawal of the rejection under 35 U.S.C. §112, first paragraph.

III. THE CLAIMS DEFINE PATENTABLE SUBJECT MATTER

The Office Action rejects claims 1, 2, 4-18, 21-23, 25-28, 30-33 and 35-38 under 35 U.S.C. §103(a) over U.S. Patent No. 5,32,207 to Cathey et al. and U.S. Patent No. 5,200,630 to Nakamura et al.; claims 40-43, 46-49 and 56-63 under 35 U.S.C. §103(a) over Cathey et al., Nakamura and further in view of JP 58-90722 to Sato, and further in view in light of the Applicants' disclosure in the specification. In addition, page 5 of the Office Action rejects claim 20 under 35 U.S.C. §103 over Cathey et al. and Nakamura et al. These rejections are respectfully traversed.

Cathey et al. and Nakamura et al. do not teach, disclose or suggest, individually or in combination, "crystallizing at least a surface layer of the thin film by applying energy through {

a window that exhibits transparency to the energy to the surface of the thin film, wherein a distance between the window and the thin film is more than about 20 mm, and at least the surface layer of the thin film is melted by the applied energy and crystallized by cooling solidification, the thin film being melted under a hydrogen-containing atmosphere of inert gas having a total pressure of at least atmospheric pressure, wherein unpaired bonding electrons on the surface of the thin film during the cooling solidification are terminated by hydrogen atoms in the hydrogen-containing atmosphere of inert gas to reduce the scatter of melted thin film and to make the distance sufficient for the reduced scatter," as recited in claim 1, and as similarly recited in claims 12, 20, 25, 30, 35, 40, 46 and 56.

Instead, Nakamura et al. discloses generation of a hydrogen plasma in a vacuum chamber using laser beams irradiated onto an amorphous silicon (col. 4, lines 53-64). Likewise, Cathey et al. merely discloses that the macro-grain polycrystalline substrate 11 is amorphized to obscure the grain boundaries using fluorine ions (col. 4, lines 42-54).

Sato does not make up for these deficiencies. Instead, Sato discloses inclining of a single crystal layer with respect to a laser beam 10 obliquely applied thereto.

The Applicants' specification does not make up for the deficiencies. Specifically, Section II of the Applicants' specification titled "Description of Related Art" does not teach, disclose or suggest the above-recited claim feature. Instead, page 4 of the December 11, 1997 specification discloses another conventional method for obtaining a crystalline semiconductor film at a low temperature; page 5 of the specification discloses irradiation under atmospheric pressure, the use of an inert gas atmosphere and melt crystallization; page 6 of the specification discloses a laser irradiation under vacuum or in an inert gas atmosphere, wherein, page 7 of the specification succinctly states the shortcomings of the conventional methods, reciting "However, in a conventional crystallization method, such control is not sufficiently obtained and thus a superior crystallization film cannot be obtained. Further, the

characteristics of the crystalline film vary greatly with variations in the state of the reconstructed surface at each melt crystallization." Thus, Applicants' disclosure in Section II of the specification does not make up for these deficiencies.

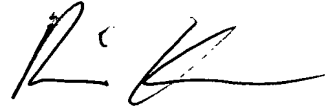
For at least these reasons, it is respectfully submitted that claims 1, 12, 20, 25, 30, 35, 40, 46 and 56 are patentable over the applied references. The dependent claims are likewise patentable over the applied references for at least the reasons discussed as well as for the additional features they recite. Applicants respectfully request that the rejections under 35 U.S.C. §103 be withdrawn.

IV. CONCLUSION

In view of the foregoing, it is respectfully submitted that this application is in condition for allowance. Favorable reconsideration and prompt allowance of claims 1, 2, 4-18, 20-23, 25-28, 30-33, 35-38, 40-43, 46-49 and 56-63 are earnestly solicited.

Should the Examiner believe that anything further would be desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact the undersigned at the telephone number set forth below.

Respectfully submitted,



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